600
Sy25b
no.15

TECHNICAL EDUCATION BRANCH.

TECHNOLOGICAL MUSEUM,
HARRIS STREET, SYDNEY.
A. R. PENFOLD, F.A.C.I., F.C.S., CURATOR.

BULLETIN No. 15.

Ambergris and How to Recognise It.

BY
F. R. MORRISON, F.C.S., A.A.C.I., A.S.T.C.,
Assistant Economic Chemist, Sydney Technological Museum.

THE LIBRARY OF THE
MAY 15 1930
UNIVERSITY OF

Sydney:
Alfred James Kent, I.S.O., Government Printer.
1929.
*35296—A

THE LIBRARY OF THE
MAY 15 1930
UNIVERSITY OF

TECHNICAL EDUCATION BRANCH.

TECHNOLOGICAL MUSEUM,
HARRIS STREET, SYDNEY.
A. R. PENFOLD, F.A.C.I., F.C.S., CURATOR.

BULLETIN No. 15.

Ambergris and How to Recognise It.

BY
F. R. MORRISON, F.C.S., A.A.C.I., A.S.T.C.,
Assistant Economic Chemist, Sydney Technological Museum.

Sydney:
Alfred James Kent, I.S.O., Government Printer.
1929.
*35296—A

600
Sy25b
no.15

AMBERGRIS AND HOW TO RECOGNISE IT.

BY

F. R. MORRISON, F.C.S., A.A.C.I., A.S.T.C.
Assistant Economic Chemist, Technological Museum, Sydney.

FOREWORD.

THE large number of substances thought to be ambergris, which has been submitted to the Sydney Technological Museum in recent years, has indicated the urgent need for the dissemination of facts and information concerning this valuable material.

Apart from one or two articles written by experts who have extensively handled the material and several detailed chemical and microscopic examinations of individual pieces, the descriptions and tests for the identification of ambergris which have been published in scientific and other journals up to the present time, whilst more or less accurate, do not, in the writer's opinion, furnish enough information for the recognition and identification of the material. In the majority of cases the information given has been equally applicable to other materials, and for this reason apparently, many substances of a fatty or wax-like nature, which have been picked up on the sea coasts of Australia or found floating on the surface of the Pacific Ocean have been submitted to this Institution for confirmation of the firm belief that such materials consisted of genuine ambergris, since they appeared to answer to the published descriptions of that substance. Naturally much disappointment has followed the reports of examinations, whereby the substances have been shown to be other than ambergris.

This Bulletin, therefore, is issued with the object of endeavouring to put forward in as simple a manner as possible descriptions of the several forms in which ambergris may be found, together with one or two simple tests, which, it is hoped, will enable finders of materials thought to be ambergris to form a reasonably definite opinion as to whether or not they consist of this substance.

It is recommended, however, that in order that confirmation of the identity of such substances may be obtained, a small sample be submitted to the Curator of the Technological Museum, Sydney, who will be pleased to furnish, gratis, a report on the identity of the sample, and, if found to be ambergris, to place finders in touch with those who specialise in the handling of this material.

Origin and Source.—Briefly, it may be stated that ambergris is found in the intestine of the Spermaceti whale (*Physeter macrocephalus*) on but rare occasions, apparently when the animal is in a sickly condition. Its formation is thought by some to be caused by indigestible portions of the whale's food setting up irritation in the intestine which causes a secretion from that organ to build up around the irritating substance. Since the principal food of the sperm whale is squid or cuttle-fish, it is surmised that the horny beaks, which resemble those of a parrot, and are not digested, cause the irritation mentioned above. The fact that almost perfect cuttle-fish beaks as well as broken pieces are often found embedded in ambergris, affords evidence for the above assumption.

It must be emphasised, however, that the number of whales in which ambergris is found is very small, thus indicating that only under exceptional circumstances is ambergris produced.

It is stated that if the whale is able to reject the material soon after it forms, it is soft and black; if, on the other hand, it remains in the animal and accumulates, it eventually obstructs the intestine and causes the death of the animal. The carcase is gradually broken up, eaten by fish, &c., and the compact brown or grey material, which is much harder than the black variety, floats to the surface of the ocean and may be washed ashore. It is this latter variety which has been found, or rare occasions, in pieces weighing up to 200 lb. In the majority of cases, however, ambergris is found in pieces varying in weight from a fraction of an ounce to a few pounds, an average piece weighing 2 or 3 ounces.

Derivation of Name.—The word "ambergris" is derived from the French *gris,* grey, and the Arabic word for amber, thus signifying *grey amber,* in allusion to a resemblance to the well-known fossil resin known as amber.

Uses of Ambergris.—Ambergris is recorded as having been used in medicine, and in sacramental rites by Eastern races for some hundreds of years. Modern medical practice, however, is unable to find foundation for its use in this connection.

The great value of ambergris at the present time lies almost solely in its application to perfumery. In high-grade perfumes which consist of a solution of many oils in spirit, the presence of a constituent which will " hold " or " fix " the odours of the blended oils in such a manner that the fragrance will be always the same, and at the same time will not allow the perfume to evaporate too quickly, is necessary, and such a substance is known as a " fixative." To date no other substance has been found which fulfils the requirements of a fixative in perfumery so admirably as does ambergris. Itself a substance of " musty " odour, nevertheless it possesses the unique property referred to, and on account of the demand always exceeding the supply, the value is high and varies from 5s. to £6 per oz., according to quality.

Descriptions of Various Grades of Ambergris.—The following descriptions refer to materials actually handled and examined by the writer. The descriptive headings have been chosen for convenience, and are not necessarily commercial names. All the specimens described were obtained from beaches on the New Zealand coast.

Black and Soft Ambergris.—This is a soft material with a black polished surface, which latter when scraped with a knife or finger-nail reveals a dark-brown interior, the colour, however, quickly darkening on exposure. In appearance and character this type of ambergris closely resembles soft pitch. When moulded and "worked" between the fingers it becomes tacky and adheres to the skin. The odour is rather unpleasant and penetrating, but characteristically " musty " (no other word adequately describes it). To the writer's olfactory sense the odour is of an " acid " type.

The value of this low-grade ambergris varies from 5s. to 10s. per oz.

Dark Grey to Black and Medium Hard Ambergris.—An almost black solid material of dull appearance, which when broken or scraped, exhibits a dark-brown interior, the colour darkening on exposure to air. It possesses a musty odour, which, however, is slightly sweet and reminds one somewhat of caramel (slightly burned sugar); it lacks the strong odour of the soft black ambergris. It is soft enough to be easily penetrated by the finger-nail,

and a small piece when moulded in the warm hand becomes very plastic, resembling pitch. Cuttle-fish beaks are often found in this variety of ambergris, either complete or in broken pieces. Bluish or grey patches are sometimes noticed on the surface of samples, especially after having been kept for some time.

This variety is valued at 40s. to 50s. per oz.

Nugget Ambergris.—As the name implies, this variety consists of more or less rounded pieces or nuggets which are often found embedded in the soft black variety. When the latter is removed, the nuggets are seen to consist of material more compact and harder than the varieties already described. Although it may be marked with the finger-nail, yet it is brittle to the extent that pieces may be broken from the lump with the fingers in a similar manner to hard pitch. The colour varies from light to dark brown, and a freshly-broken surface appears rather resinous; it is either streaked or mottled with white spots about pin-head size. Some samples are observed to be built up of thin layers or laminae.

Although brittle at normal temperature, a piece when worked between the fingers gradually becomes quite plastic and dark, resembling, as in the previous cases, soft pitch.

The odour is characteristically musty but not as powerful as the previously described varieties. After keeping in a stoppered bottle or closed tin for a few hours the odour becomes well developed and is rather like that which one associates with damp, moss-covered earth. In some cases it is modified by a slight honey-like odour.

Valued at 60s. to 80s. per oz., nugget ambergris is of good quality for the purpose desired, consequently it is well worth while to search for this variety in large pieces of soft black ambergris which may be found.

Best Grey Ambergris.—A compact, light slate-grey material with a slight musty odour; harder than the previously described varieties but soft enough to retain the impression of the finger

nail. When moulded between the fingers it becomes black and plastic, and the odour more definite.

Value 80s. to 120s. per ounce.

White Ambergris.—This rather rare form is chalky-white, brittle, and possesses a very faint musty odour. It crumbles when scraped with the fingernail. A slightly-heated piece when worked between the fingers becomes soft, plastic, and brown in colour. Some samples exhibit a pitted or honeycomb surface, and under the magnifying glass are seen to consist of both white and light yellow resinous-looking materials.

The value of this variety is somewhat uncertain but is probably equal to that of best grey ambergris.

Ambergris has usually been described as a fatty or wax-like substance; whilst true to a certain extent, the writer prefers to regard it as resembling pitch rather than wax or fat, especially when worked up between the fingers. It might be compared with what is known as "Cobbler's Wax" as used by boot repairers, but the latter material consists largely of pitch, so that the analogy still holds good.

Ambergris does not, according to the writer's experience, cause the skin to become greasy as do waxes and fats.

Simple Tests for Ambergris.

It is a somewhat difficult matter to put forward tests for the identification of a substance, which are capable of being successfully carried out by those other than chemists. The following tests, however, are indicated, which it is hoped, will serve as supplementary guides, when taken in conjunction with the characteristic musty odour and pitch-like plasticity.

Hot wire test.—In published descriptions of ambergris it is generally stated that "it emits an odoriferous liquid when penetrated with a hot needle." The present writer considers that, when properly carried out and the results carefully noted, this test is an excellent one.

Procedure.—A piece of wire, needle, or similar article is held in the gas or candle flame for about ten to twenty seconds, then

pressed into the sample to a depth of one-eighth of an inch, when, if genuine ambergris, a dark brown to black resinous liquid forms around the wire and appears to boil. The wire is withdrawn and, before the melted material on the sample cools, it is touched with the finger, when tacky pitch-like "strings" adhere to the skin. When cold, the ring of melted ambergris is shiny, and resembles dark brown or black enamel. The wire, which retains portion of the melted material, is now placed in the flame for a few seconds, and removed, when it will be observed that the ambergris has taken fire. The flame is extinguished and the odour of the "smoke' noted. Ambergris gives a somewhat fatty or resinous odour, with a *slight odour of burning rubber* in every case.

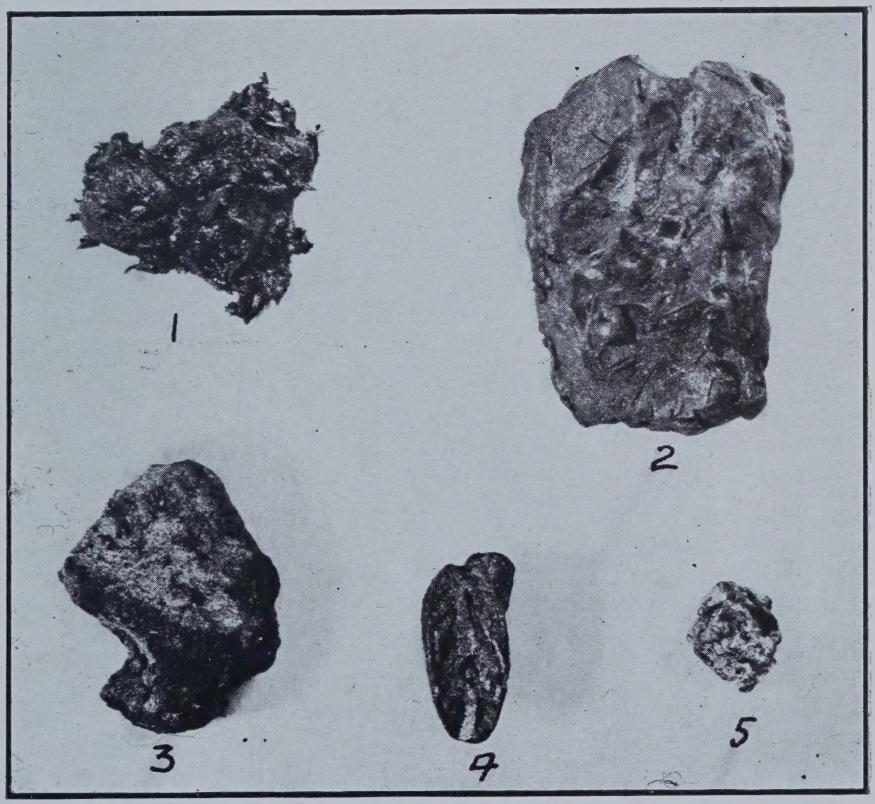
Solution in alcohol (methylated spirit).—A piece of ambergris about the size of a pea when treated with about half an ounce (three teaspoonfuls) of alcohol, and warmed or allowed to stand for some hours with occasional shaking, is almost completely dissolved, any insoluble black specks settling to the bottom of the vessel. The solution when placed in sunlight is seen to exhibit fluorescence, which may be described as the peculiar greenish or bluish "shot" effect which is particularly noticeable in motor lubricating oils, bottles of which may be seen at most garages and service stations. In diffused daylight the solutions vary from light yellow to golden brown according to the quality of the ambergris.

If rectified spirit has been used for dissolving the ambergris, a piece of muslin or blotting paper may be moistened with the solution and allowed to dry in the air. The characteristic musty odour of ambergris is thereby fully developed, and, in the case of good ambergris, the odour is retained by the cloth after washing with soap.

Melting Point.—All ambergris will float on sea-water, and if the latter is slowly heated, the material will melt to a brown or black liquid before the temperature of the water reaches boiling point.

The accompanying illustration shows the various forms of ambergris described in the foregoing pages, and will give some idea of the appearance of the material.

In conclusion, the writer's thanks are due to Mr. T. C. Roughley, Economic Zoologist of the Technological Museum, Sydney, for his kindness in preparing the photograph for the illustration.



Specimens of Ambergris.

(1) Soft and black.
(2) Dark grey to black, and medium hard.
(3) Nugget.
(4) Broken nugget, showing interior.
(5) White, honeycomb variety.

Sydney: Alfred James Kent, I.S.O., Government Printer—1929.

THE LIBRARY OF THE
MAY 15 1930
UNIVERSITY OF

UNIVERSITY OF ILLINOIS-URBANA
3 0112 120127136